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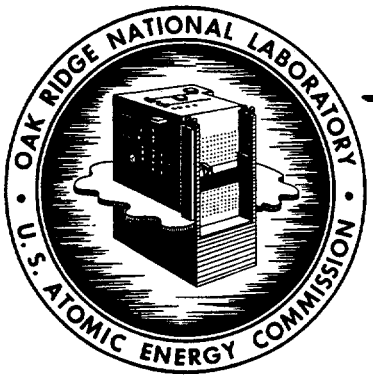
OPERATIONS DIVISION

QUARTERLY REPORT

OCTOBER-DECEMBER 1958



OAK RIDGE NATIONAL LABORATORY
operated by
UNION CARBIDE CORPORATION
for the
U.S. ATOMIC ENERGY COMMISSION

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OPERATIONS DIVISION

QUARTERLY REPORT

October - December, 1958

By

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E. J. Witkowski

DATE ISSUED

APR 28 1959

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee
operated by
UNION CARBIDE CORPORATION
for the
U. S. ATOMIC ENERGY COMMISSION

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OPERATIONS DIVISION

Quarterly Report

October - December 1958

SUMMARY

The trouble with spurious scrams at the ORR has been largely remedied by increasing the current on the magnets holding the shim rods and by some changes in the electronic circuits. During December only two spurious scrams occurred. Considerable amounts of air activity are observed in the ORR building for approximately a day after start up. A degasifier is being installed which should help this situation by removing argon from the water.

A new lattice arrangement was adopted at the ORR in which fuel elements at the north and south ends of the lattice are completely separated from the rest of the fuel by a row of berylliur. This arrangement appears to give higher flux in the large facilities.

Another set of flux trap experiments were done in the ORR with a 2 x 2, a 3 x 3, and a 3 x 5 beryllium island in the center. The 3 x 3 experiment was compared to a heavier 3 x 3 loading which might be used for operation. The heavier loading gave a somewhat lower value of the flux peaking than did the lighter loadings.

Work done on different methods of annealing the stored energy in the Graphite Reactor has indicated that the reverse flow technique would be cheaper and much faster than the other methods considered. It does not appear to have appreciable hazards beyond those encountered in routine operation.

Data accumulated on the efficiency of the Waste Treatment Plant indicates that more than 75% of the major contaminants are removed.

4. LABORATORY FACILITIES

E. J. Witkowski

4.1. Radioactive Waste Disposal

White Oak Creek Discharge to Clinch River

The Health Physics monitoring data for radioactive waste discharged into the Clinch River during the last two quarters of 1958 are listed in Table 4.1. A weekly discharge of 400% of the MPC value was caused by a wash out of silt into the river from the former White Oak Creek bed during a period of heavy rainfall when the river was held at a high level.

TABLE 4.1. CLINCH RIVER MONITORING DATA

	% of MPC* in Clinch River	
	Average for Quarter	Highest Weekly Discharge
October 1 - December 31, 1958	48	400
July 1 - September 30, 1958	80	240

*The MPC in the Clinch River is the weighted average of the MPC values for occupational exposure of the individual radioisotopes as set forth by national and international committees on radiation protection. For prolonged exposure of a large population, it is recommended that the permissible levels be reduced by a factor of ten.

Liquid Waste Operating Data

The operating data for this quarter and the accumulated totals for 1958 and 1957 are given in Table 4.2.

4.2. LIQUID WASTE OPERATING DATA

	This Quarter	Total for 1958	Total for 1957
Process waste discharged to White Oak Creek, gal	53,090,000	233,340,000	272,910,000
Activity discharged to White Oak Creek, curies	19.9	91.8*	188.9
Waste to lagoons, gal	845,000	3,157,000	2,903,000
Activity to lagoons, curies	10,540	52,795	41,918
Total activity discharged to lagoons 2, 3, and 4 to date, curies	166,986		
Total volume discharged to lagoons 2, 3, and 4 to date, gal	11,703,000		

*Lowest annual discharge on record. The Metal Recovery Building Canal was the origin of more than one-half of the total.

Process Waste Treatment Plant

The main contaminants removed from the process waste before discharge to White Oak Creek during the months of October and December are listed in Table 4.3. The information for the month of November is not included because of a mix-up of samples resulting in meaningless results. Partial analyses made on weekly composite samples, however, indicated that the operation of the plant was normal; and the decontamination efficiency was essentially the same as that of October and December.

The addition of clay, begun in September, was continued throughout this quarter. As indicated in Table 4.3, the most significant improvement in decontamination was accomplished in the removal of Cs^{137}.

TABLE 4.3. PROCESS WASTE TREATMENT PLANT OPERATING DATA

Volume Processed--24,803,000 gal

Contaminant	Activity (curies) In	Activity (curies) Out	Amount Removed (%)
Sr^{90}	14.80	1.63	89
Sr^{89}	0.76	0.09	88
Ru^{106}	0.34	0.10	71
Cs^{137}	27.49	5.08	82
Co^{60}	1.46	0.41	72
Total rare earths	20.30	4.23	79

Stack Monitoring Data

The monitoring data for stacks 3020 and 3039 are given in Table 4.4.

TABLE 4.4. STACK MONITORING DATA

	% of Maximum Permissible Operating Level*	
	Stack 3020	Stack 3039
Average daily discharge	0.2	0.3
Highest daily discharge	23.7	2.3

*The maximum permissible operating level for air contamination has been arbitrarily established by Health Physics so as not to exceed more than 10% of the permissible exposure level. The stack discharges are restricted to values which, in combined effect and under the worst conditions of dispersion, would not exceed at any point ground concentrations equal to the maximum permissible operating level.

4.2. Steam Plant and Utilities

The significant operating data for the steam plant and utilities are given in Table 4.5.

TABLE 4.5. OPERATING DATA FOR PERIOD ENDING DECEMBER 31

	This Quarter	Fiscal Year 1959 to Date	Fiscal Year 1958
Steam produced,* M lb	142,115	220,434	480,647
Maximum steam demand, M lb/hr	116	116	135
Gas used, M ft^3	169,909	272,829	648,096
Oil used, gal	1,625	2,253	2,788
Electric power consumed at steam plant, kwhr	137,500	275,500	547,500
Electric power consumed by compressors, kwhr	416,800	874,000	1,554,100
Chlorinated sewage effluent, M gal	12,760	27,535	60,011
Treated water consumed at X-10, M gal	263,352	641,690	1,148,792
Maximum rate of water consumption M gal/day	3,360	5,108	4,790

*Excluding use in steam plant

Steam Plant

The batteries in the flame control circuit were found to be damaged and unable to hold a full charge. They were temporarily replaced with borrowed batteries and arrangements were made to purchase new ones. These batteries had been in service eight years.

Through alterations to the existing piping, the No. 4 boiler was put on a separate gas control valve to improve its operating stability. The boiler has been operated consistently at 55,000 lb/hr thus far this winter to determine whether the operation can be maintained at this high level, as recom-